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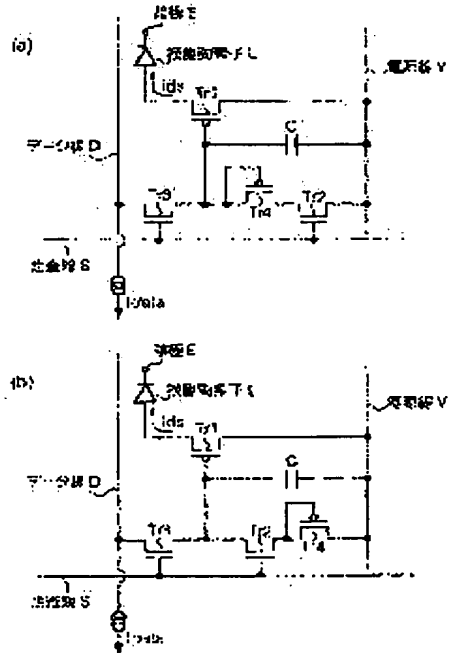
(54) UNIT CIRCUIT, ELECTRONIC CIRCUIT, ELECTRONIC DEVICE, OPTOELECTRONIC DEVICE, DRIVING METHOD AND ELECTRONIC EQUIPMENT

(57)Abstract:

PROBLEM TO BE SOLVED: To compensate the dispersion of a driving transistor Tr1.

SOLUTION: A pixel circuit is provided with a current type element to be driven L, a driving transistor Tr1 which controls the amount of current to be supplied to the element L, a capacitive element C which is connected to the gate of the transistor Tr1, a switching transistor Tr3 which is connected to the gate of the transistor Tr1, a scanning line S which is connected to the gate of the transistor Tr3, a data line D which is connected to either the source or the drain of the transistor Tr3 and a power supply line V which is connected to a signal line through the transistor Tr3. A compensation transistor Tr4 that is diode connected is provided between the line V and the transistor Tr3.



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CLAIMS

[Claim(s)]
[Claim 1]
A driven element,
A drive transistor which controls a current amount to said driven element,
A capacitative element connected to a gate of said drive transistor,
Direct continuation is carried out to said gate, and a compensation transistor by which diode connection was carried out is included,
Switch-on of said drive transistor is set up according to data currents which pass said compensation transistor and which are supplied as a data signal.
A unit circuit characterized by things.
[Claim 2]
In the unit circuit according to claim 1,
Said compensation transistor and the 1st switching transistor connected in series via either one of sauce or a drain are included,
When sauce of said 1st switching transistor or another side of a drain is connected to a signal wire and said signal wire and said compensation transistor are electrically connected via said 1st switching transistor, said data currents pass said compensation transistor.
A unit circuit characterized by things.
[Claim 3]
A driven element,
A drive transistor which controls a current amount to said driven element,
A capacitative element connected to a gate of said drive transistor,
The 1st switching transistor connected to a gate of said drive transistor,
The 1st signal wire connected to a gate of said 1st switching transistor, and the 2nd signal wire connected to sauce of said 1st switching transistor, or either of the drains,

It is the unit circuit provided with a power source wire in which power supply voltage was impressed,
It has a compensation transistor and the 2nd switching transistor which were connected in series between said power source wire, sauce of said 1st switching transistor or any of a drain, or another side,
Diode connection of said compensation transistor is carried out,
A gate of said 2nd switching transistor is connected to the 3rd different signal wire from said 1st signal wire.
A unit circuit characterized by things.
[Claim 4]
In the unit circuit according to claim 3,
A period when both said 1st switching transistor and said 2nd switching transistor will be in an ON state is provided.
A unit circuit characterized by things.
[Claim 5]
A driven element,
A drive transistor which controls a current amount to said driven element,
A capacitative element connected to a gate of said drive transistor,
The 1st switching transistor connected to a gate of said drive transistor,
The 1st signal wire connected to a gate of said 1st switching transistor, and the 2nd signal wire connected to sauce of said 1st switching transistor, or either of the drains,
It is the unit circuit provided with a power source wire in which power supply voltage was impressed,
It has a compensation transistor and the 2nd switching transistor which were connected in series between said power source wire, sauce of said 1st switching transistor or any of a drain, or another side,
Diode connection of said compensation transistor is carried out,
A gate of said 2nd switching transistor is connected to said 1st signal wire.
A unit circuit characterized by things.
[Claim 6]
In the unit circuit according to claim 3 or 5,
A unit circuit, wherein said 2nd signal wire supplies current as a data signal.
[Claim 7]
In the unit circuit according to claim 6,
A unit circuit, wherein said capacitative element stores electricity an electric charge according to a current amount which flows into said compensation transistor.
[Claim 8]

The unit circuit according to any one of claims 1 to 7 characterized by a current characteristic between source drains to gate voltage being the same in abbreviation in said drive transistor and said compensation transistor.

[Claim 9]

The unit circuit according to any one of claims 1 to 7, wherein a current amount which flows into said compensation transistor is larger than a current amount controlled by said drive transistor.

[Claim 10]

A unit circuit characterized by said driven element being an organic electroluminescence element in the unit circuit according to any one of claims 1 to 9.

[Claim 11]

A unit circuit characterized by said drive transistor, said 1st and 2nd switching transistors, and said compensation transistor being thin film transistors, respectively in the unit circuit according to any one of claims 3 to 10.

[Claim 12]

A unit circuit characterized by said drive transistor being a p channel type in the unit circuit according to any one of claims 1 to 11.

[Claim 13]

The 1st switching transistor by which either one of sauce or a drain was connected to the data line while one or turning off according to a scanning signal supplied to the 1st scanning line,
A power source wire in which power supply voltage is impressed, sauce of said 1st switching transistor, or a drain is a compensation transistor and the 2nd switching transistor which were connected in series between another side either,
A compensation transistor which functions as a diode,
The 2nd switching transistor one [the switching transistor] or turned off according to a scanning signal supplied to the 2nd different scanning line from said 1st scanning line,
Sauce of said 1st switching transistor or a drain of a gate is a drive transistor which is connected to another side and drives a driven element either,
A capacitative element holding gate voltage of said drive transistor
A providing unit circuit.

[Claim 14]

The 1st switching transistor by which either one of sauce or a drain was connected to the data line while one or turning off according to a scanning signal supplied to the 1st scanning line,
A power source wire in which power supply voltage is impressed, sauce of said 1st switching transistor, or a drain is a compensation transistor and the 2nd switching transistor which were connected in series between another side either,
A compensation transistor which functions as a diode,

The 2nd switching transistor one [the switching transistor] or turned off according to a scanning signal supplied to said 1st scanning line,
Sauce of said 1st switching transistor or a drain of a gate is a drive transistor which is connected to another side and drives a driven element either,
A capacitative element holding gate voltage of said drive transistor
A providing unit circuit.
[Claim 15]
A switching transistor by which either one of sauce or a drain was connected to the data line while one or turning off according to a scanning signal supplied to a scanning line,
The 1st power source wire in which the 1st power supply voltage is impressed in a period [one / a period / said switching transistor] of at least a part or all of a period, sauce of said switching transistor, or a drain is a compensation transistor which functions as a diode between another side either,
A drive transistor in which it is connected to the 2nd power source wire in which the 2nd power supply voltage was impressed, and self sauce or one side of a drain drives a driven element while a gate is connected to sauce of said switching transistor, or another side of a drain,
A capacitative element holding gate voltage of said drive transistor
A providing unit circuit.
[Claim 16]
A switching transistor by which either one of sauce or a drain was connected to the data line while a gate was connected to a scanning line with which a scanning signal is supplied,
It is the compensation transistor by which a gate was connected to sauce or a drain,
Either one of sauce or a drain is connected to the 1st power source wire in which the 1st power supply voltage is impressed in a period [one / according to said scanning signal / a period / said switching transistor] of at least a part or all of a period, To sauce of said switching transistor or any of a drain, or another side, self sauce or a drain is the compensation transistor to which another side was connected either,
A drive transistor in which it is connected to the 2nd power source wire in which the 2nd power supply voltage was impressed, and self sauce or one side of a drain drives a driven element while a gate is connected to sauce of said switching transistor, or another side of a drain,
A capacitative element to which an end was connected at a gate of said drive transistor
A providing unit circuit.
[Claim 17]
The unit circuit according to claim 15 or 16 which omits said 1st power supply voltage and said 2nd power supply voltage, is in them, and is characterized by things.
[Claim 18]
An electronic device provided with at least one unit circuit according to any one of claims 1 to

17.

[Claim 19]

Electronic equipment mounting an electro-optic device provided with the unit circuit according to any one of claims 1 to 17 as a pixel circuit.

[Claim 20]

It is an electronic circuit including two or more unit circuits,

Each of two or more of said unit circuits,

A drive transistor containing the 1st terminal and 2nd terminal,

A compensation transistor to which said 3rd terminal was connected at a gate of said drive transistor including the 3rd terminal and 4th terminal,

A switching transistor by which said 5th terminal was connected to a gate and said 3rd terminal of said drive transistor including the 5th terminal and 6th terminal,

A capacitative element to which an end was connected at a gate of said drive transistor while holding charge quantity according to current which flows via said compensation transistor and said switching transistor

An implication,

Said 4th terminal is connected to the 1st power source wire with said 4th terminal of others and a unit circuit among said two or more unit circuits,

Said 2nd terminal is connected to the 2nd power source wire,

It has a control circuit which sets said 1st power source wire as two or more potential, or controls cutting and connection between said 1st power source wire and power supply potential.

An electronic circuit characterized by things.

[Claim 21]

In the electronic circuit according to claim 20,

An electronic circuit, wherein no transistors other than said drive transistor, said compensation transistor, and said switching transistor exist in each of said unit circuit.

[Claim 22]

In the electronic circuit according to claim 20 or 21,

An electronic circuit where said compensation transistor is characterized by connecting the gate to said 3rd terminal.

[Claim 23]

In the electronic circuit according to any one of claims 20 to 22,

An electronic circuit, wherein a conductivity type of said drive transistor and said compensation transistor is the same.

[Claim 24]

An electronic circuit, wherein an electronic device is connected to said 1st terminal in the

electronic circuit according to any one of claims 20 to 23.
[Claim 25]
In the electronic circuit according to claim 24,
An electronic circuit, wherein said electronic device is a driven element by which a current drive is carried out.
[Claim 26]
In the electronic circuit according to any one of claims 20 to 24,
Said control circuit is a transistor containing the 7th terminal and 8th terminal, said 7th terminal is connected to a power supply, and said 8th terminal is connected to said 1st power source wire.
An electronic circuit characterized by things.
[Claim 27]
In the electronic circuit according to any one of claims 20 to 24,
A period when current is flowing via said compensation transistor and said switching transistor, an electronic circuit characterized by setting up potential of said 1st power source wire and said 2nd power source wire become same electric potential substantially at least.
[Claim 28]
In the electronic circuit according to claim 27,
An electronic circuit, wherein said 1st power source wire and said 2nd power source wire can electrically connect with a power supply which has same electric potential.
[Claim 29]
In the electronic circuit according to any one of claims 20 to 27,
An electronic circuit, wherein threshold voltage of said drive transistor is set up not become higher than threshold voltage of said compensation transistor.
[Claim 30]
In the electronic circuit according to any one of claims 20 to 27,
An electronic circuit, wherein a current amount which flows into said compensation transistor is larger than a current amount controlled by said drive transistor.
[Claim 31]
It is the electro-optic device provided with two or more unit circuits,
Each of two or more of said unit circuits,
A drive transistor containing the 1st terminal and 2nd terminal,
A compensation transistor to which said 3rd terminal was connected at a gate of said drive transistor including the 3rd terminal and 4th terminal,
A switching transistor by which said 5th terminal was connected to a gate and said 3rd terminal of said drive transistor including the 5th terminal and 6th terminal,
An electrooptics element connected to said 1st terminal,

A capacitative element which held charge quantity according to current which flows via said compensation transistor and said switching transistor and to which an end was connected at a gate of said drive transistor
An implication,
Common connection of the 1st power source wire connected to said 4th terminal is carried out also to said 4th terminal of other at least one unit circuit among said two or more unit circuits,
Said 2nd terminal is connected to the 2nd power source wire,
It has a control circuit which sets said 1st power source wire as two or more potential, or controls cutting and connection between said 1st power source wire and power supply potential.
An electro-optic device characterized by things.
[Claim 32]
In the electro-optic device according to claim 31,
An electro-optic device, wherein said electrooptics element is an organic EL device.
[Claim 33]
In the electro-optic device according to claim 31 or 32,
Said control circuit is a transistor containing the 7th terminal and 8th terminal, said 7th terminal is connected to a power supply, and said 8th terminal is connected to said 1st power source wire.
An electro-optic device characterized by things.
[Claim 34]
In the electro-optic device according to any one of claims 31 to 33,
An electro-optic device, wherein potential of said 1st power source wire and said 2nd power source wire at least is set up during the period when current is flowing via said compensation transistor and said switching transistor become same electric potential substantially.
[Claim 35]
In the electro-optic device according to claim 34,
An electro-optic device, wherein said 1st power source wire and said 2nd power source wire can electrically connect with a power supply which has same electric potential.
[Claim 36]
In the electro-optic device according to any one of claims 31 to 34,
An electro-optic device, wherein threshold voltage of said drive transistor is set up not become higher than threshold voltage of said compensation transistor.
[Claim 37]
It is an electro-optic device containing a unit circuit arranged corresponding to each intersection of two or more scanning lines, two or more data lines, and a scanning line of said plurality and said two or more data lines, respectively, and two or more 1st power source

wires,
Each of said unit circuit,
A drive transistor containing the 1st terminal and 2nd terminal,
A compensation transistor to which said 3rd terminal was connected at a gate of said drive transistor including the 3rd terminal and 4th terminal,
A switching transistor by which said 5th terminal was connected to a gate and said 3rd terminal of said drive transistor including the 5th terminal and 6th terminal,
An electrooptics element connected to said 1st terminal,
A capacitative element which held charge quantity according to a current value which flows via said compensation transistor and said switching transistor and to which an end was connected at a gate of said drive transistor
An implication,
Common connection of the gate of a switching transistor contained in a series of unit circuits is carried out to one scanning line, and common connection of the 4th terminal in said a series of unit circuits is carried out to the 1st one power source wire,
It has a control circuit which sets each of said 1st power source wire as two or more potential, or controls cutting and connection between the 1st one power source wire and power supply potential.
An electro-optic device characterized by things.
[Claim 38]
In the electro-optic device according to claim 37,
An electro-optic device, wherein common connection of the 2nd terminal in said a series of unit circuits is carried out to the 2nd one power source wire.
[Claim 39]
In the electro-optic device according to claim 37 or 38,
An electro-optic device, wherein a gate of said compensation transistor is connected to the 3rd self terminal.
[Claim 40]
In the electro-optic device according to any one of claims 37 to 39,
An electro-optic device which carries out the feature of said electrooptics element being an organic EL device.
[Claim 41]
In the electro-optic device according to any one of claims 37 to 39,
An electro-optic device characterized by arranging an electrooptics element of the same color along said scanning line.
[Claim 42]
A drive transistor containing the 1st terminal and 2nd terminal,

A compensation transistor to which said 3rd terminal was connected at a gate of said drive transistor including the 3rd terminal and 4th terminal,
A switching transistor by which said 5th terminal was connected to a gate and said 3rd terminal of said drive transistor including the 5th terminal and 6th terminal,
A capacitative element to which an end was connected at a gate of said drive transistor
They are two or more preparations about a ****** unit circuit,
The 4th terminal in a series of unit circuits is a drive method of an electronic circuit by which common connection was carried out to the 1st power source wire,
By making into an ON state each of a switching transistor which carries out the electrical link of each of the 4th terminal of said a series of unit circuits to prescribed potential, and is contained in said a series of unit circuits, A step which holds charge quantity according to current which flows via said compensation transistor to a capacitative element, impresses voltage according to said charge quantity to said drive transistor, and sets up switch-on between said 1st terminal and said 2nd terminal,
A step which separates electrically each of the 4th terminal of said a series of unit circuits from said prescribed potential
****** -- a drive method of an electronic circuit characterized by things.
[Claim 43]
A drive transistor containing the 1st terminal and 2nd terminal,
A compensation transistor to which said 3rd terminal was connected at a gate of said drive transistor including the 3rd terminal and 4th terminal,
A switching transistor by which said 5th terminal was connected to a gate and said 3rd terminal of said drive transistor including the 5th terminal and 6th terminal,
An electrooptics element connected to said 1st terminal,
A capacitative element to which an end was connected at a gate of said drive transistor
A ****** unit circuit is arranged corresponding to each intersection of two or more scanning lines and two or more data lines, respectively,
It is a drive method of an electro-optic device with which common connection of the gate of a switching transistor contained in a series of unit circuits was carried out to one scanning line, and common connection of the 4th terminal in said a series of unit circuits was carried out to the 1st one power source wire,
Supply a scanning signal to a gate of a switching transistor which carries out the electrical link of each of the 4th terminal of said a series of unit circuits to prescribed potential, and is contained in said a series of unit circuits, respectively, and as an ON state, Hold charge quantity according to a current level of current which flows into a period electrically connected with the data line with which said two or more data lines correspond via said compensation transistor to a capacitative element, and voltage according to said charge quantity is

impressed to said 1st gate, A step which sets up switch-on between said 1st terminal and said 2nd terminal,

A step which separates electrically each of the 4th terminal of said a series of unit circuits from said prescribed potential

****** -- a drive method of an electro-optic device characterized by things.

[Claim 44]

Electronic equipment mounting the electronic circuit according to any one of claims 20 to 30.

[Claim 45]

Electronic equipment mounting the electro-optic device according to any one of claims 31 to 41.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]
This invention relates to the unit circuit, the electronic circuit, the electro-optic device, the drive method, and electronic equipment with which the characteristic variation of the transistor which drives a current [, such as an organic electroluminescence element,] type driven element is compensated.
[0002]
[Description of the Prior Art]
In recent years, the organic electroluminescence (Electronic Luminescence) element attracts attention as a next-generation light-emitting device which replaces the conventional LCD (Liquid Crystal Display) element. It has the characteristic outstanding as a display panel -- since an organic EL device is a spontaneous light type, since a back light and catoptric light are unnecessary, there is with low power consumption that there is little view angle dependence.
[0003]
As a conventional circuit for driving such an organic EL device, the composition shown in drawing 14 is mentioned, for example. In this circuit, the drain of drive transistor Tr1 is connected to the current type driven element L (organic EL device) via the electrode for hole injections. Connect the gate of switching transistor Tr3 to the scanning line S, sauce is connected to data-line D, and the drain is connected to the gate of drive transistor Tr1, and the end of the capacitative element C, respectively. The other end of the capacitative element C is connected to the power source wire V. On-off control of switching transistor Tr3 is carried out by the selection potential supplied to a gate from the scanning line S, and the capacitative element C stores electricity an electric charge with the signal level supplied from data-line D

during this one.

[0004]

And voltage is impressed to the gate of drive transistor Tr1 with the voltage between terminals of the capacitative element C produced by this electric charge, and the current Ids of the quantity according to this voltage is supplied to the driven element L from the power source wire V. According to the voltage impressed to the gate of drive transistor Tr1, the conductance between the source drains of drive transistor Tr1 is controlled, and, thereby, the luminosity of a L casks of driven element organic EL device is defined.

[0005]

[Problem(s) to be Solved by the Invention]

However, in the manufacturing process of the display panel which applied the above-mentioned circuit, about the characteristic of the driven element L which constitutes a pixel. To the ability to constitute comparatively uniformly over each pixel of a display panel, about the characteristic of drive transistor Tr1. It is difficult to uniform over each pixel of a display panel by various conditions, such as construction material of the membraneous quality of semiconductor membrane, thickness and impurity concentration, a diffusion region, gate dielectric film, etc., etc., thickness, and operating temperature.

[0006]

When a thin film transistor constitutes each transistor in the above-mentioned circuit here, When it is easy to produce variation in the characteristic of each transistor and a display panel is constituted especially using the above-mentioned circuit, the variation in the characteristic of the current between drain sauce to the gate voltage of drive transistor Tr1 poses a problem. That is, even if it impresses voltage common to the gate of drive transistor Tr1 of each pixel, since the current amount which flows through an organic EL device changes for every pixel with existence of the above-mentioned variation, unevenness will arise in the light emitting luminance of each pixel, and the imaging quality of a display panel will be spoiled remarkably.

[0007]

The circuit for compensating the variation in the drive transistor which drives a current type driven element from such a situation is needed.

The place which this invention was made in view of such a situation, and is made into the purpose, Influence of the characteristic variation of a drive transistor is made hard to be influenced, and it is in providing the unit circuit which can supply target current to the current type driven element of an organic EL device etc., an electronic circuit, an electro-optic device, a drive method, and electronic equipment.

[0008]

[Means for Solving the Problem]

A drive transistor by which this invention controls a current amount to a driven element and

said driven element in order to attain the above-mentioned purpose, Direct continuation is carried out to a capacitative element connected to a gate of said drive transistor at said gate, Switch-on of said drive transistor is set up according to data currents which pass said compensation transistor including a compensation transistor by which diode connection was carried out and which are supplied as a data signal. According to this composition, since direct continuation of the compensation transistor is carried out to a gate of a drive transistor, these two transistors become easy [arranging the characteristic of those two transistors or adjusting a characteristic ratio], for example, as a result of approaching mutually and being provided. Data currents which pass a compensation transistor are directly reflected in a current amount controlled by a drive transistor. Said compensation transistor and the 1st switching transistor connected in series via either one of sauce or a drain are included here, Sauce of said 1st switching transistor or another side of a drain has preferred composition for which said data currents pass said compensation transistor, when it is connected to a signal wire and said signal wire and said compensation transistor are electrically connected via said 1st switching transistor.

[0009]

This invention for attaining the above-mentioned purpose, A driven element and a drive transistor which controls a current amount to said driven element, A capacitative element connected to a gate of said drive transistor, and the 1st switching transistor connected to a gate of said drive transistor, The 1st signal wire connected to a gate of said 1st switching transistor, The 2nd signal wire connected to sauce of said 1st switching transistor, or either of the drains, Are the unit circuit provided with a power source wire in which power supply voltage was impressed, and it has a compensation transistor and the 2nd switching transistor which were connected in series between said power source wire, sauce of said 1st switching transistor or any of a drain, or another side, Diode connection of said compensation transistor is carried out, and a gate of said 2nd switching transistor is characterized by composition connected to the 3rd different signal wire from said 1st signal wire. A driven element by which the current drive of this invention is carried out and a drive transistor which controls a current amount to said driven element, A capacitative element connected to a gate of said drive transistor, and the 1st switching transistor connected to a gate of said drive transistor, The 1st signal wire connected to a gate of said 1st switching transistor, The 2nd signal wire connected to sauce of said 1st switching transistor, or either of the drains, Are the unit circuit provided with a power source wire in which power supply voltage was impressed, and it has a compensation transistor and the 2nd switching transistor which were connected in series between said power source wire, sauce of said 1st switching transistor or any of a drain, or another side, Diode connection of said compensation transistor is carried out, and a gate of said 2nd switching transistor is characterized by composition connected to said 1st signal wire.

Also in which composition, it becomes possible to compensate variation in a drive transistor. Here, since a gate of the 1st and 2nd switching transistors will be connected to the 1st same signal wire in a direction of composition of starting the latter if the former is compared with the latter, the 3rd signal wire becomes unnecessary and it becomes possible to reduce a wiring number. A transistor by which diode connection was carried out means a transistor which has either one of the sauce or a drain in the state where it was connected to a gate. In composition concerning the former, composition in which a period when both said 1st switching transistor and said 2nd switching transistor will be in an ON state is provided is preferred.
Here, in composition concerning the former and the latter, said 2nd signal wire has preferred composition which is the data line which supplies current as a data signal.
Composition that said capacitative element stores electricity an electric charge according to a current amount which flows into said compensation transistor may be used.
Although it is preferred in said drive transistor and said compensation transistor that a current characteristic between source drains to gate voltage is also the same in abbreviation, a current amount which flows into said compensation transistor may be larger composition than a current amount controlled by said drive transistor.
It is desirable for said driven element to be an organic electroluminescence element.
Although it is preferred that it is a thin film transistor, respectively as for said drive transistor, said 1st and 2nd switching transistors, and said compensation transistor, about said drive transistor, it is desirable that it is a p channel type with little aging.
[0010]
To achieve the above objects, while one [this invention] or turning off this invention according to a scanning signal supplied to the 1st scanning line, The 1st switching transistor by which either one of sauce or a drain was connected to the data line, A power source wire in which power supply voltage is impressed, sauce of said 1st switching transistor, or a drain is a compensation transistor and the 2nd switching transistor which were connected in series between another side either, A compensation transistor which functions as a diode, and the 2nd switching transistor one [the switching transistor] or turned off according to a scanning signal supplied to the 2nd different scanning line from said 1st scanning line, It is connected to sauce of said 1st switching transistor or any of a drain, or another side, and a gate is characterized by composition possessing a drive transistor which drives a driven element, and a capacitative element holding gate voltage of said drive transistor.
While one [this invention] or turning off this invention according to a scanning signal supplied to the 1st scanning line, The 1st switching transistor by which either one of sauce or a drain was connected to the data line, A power source wire in which power supply voltage is impressed, sauce of said 1st switching transistor, or a drain is a compensation transistor and the 2nd switching transistor which were connected in series between another side either, A

compensation transistor which functions as a diode, and the 2nd switching transistor one [the switching transistor] or turned off according to a scanning signal supplied to said 1st scanning line, It is connected to sauce of said 1st switching transistor or any of a drain, or another side, and a gate is characterized by composition possessing a drive transistor which drives a driven element, and a capacitative element holding gate voltage of said drive transistor. Also in which composition, it becomes possible to compensate variation in a drive transistor. Here, since a gate of the 1st and 2nd switching transistors will be connected to the same scanning line in a direction of composition of starting the latter if the former is compared with the latter, the 2nd scanning line becomes unnecessary and it becomes possible to reduce a wiring number.

[0011]

To achieve the above objects, while one [this invention] or turning off this invention according to a scanning signal supplied to a scanning line, A switching transistor by which either one of sauce or a drain was connected to the data line, The 1st power source wire in which the 1st power supply voltage is impressed in a period [one / a period / said switching transistor] of at least a part or all of a period, sauce of said switching transistor, or a drain either A compensation transistor which functions as a diode between another side, While a gate is connected to sauce of said switching transistor, or another side of a drain, It is connected to the 2nd power source wire in which the 2nd power supply voltage was impressed, and self sauce or one side of a drain is characterized by composition possessing a drive transistor which drives a driven element, and a capacitative element holding gate voltage of said drive transistor.

While a gate is connected to a scanning line with which a scanning signal is supplied, this invention, A switching transistor by which either one of sauce or a drain was connected to the data line, It is the compensation transistor by which a gate was connected to sauce or a drain, Either one of sauce or a drain is connected to the 1st power source wire in which the 1st power supply voltage is impressed in a period [one / according to said scanning signal / a period / said switching transistor] of at least a part or all of a period, On sauce of said switching transistor or any of a drain, or another side, self sauce or a drain either A compensation transistor to which another side was connected, While a gate is connected to sauce of said switching transistor, or another side of a drain, Self sauce or one side of a drain is connected to the 2nd power source wire in which the 2nd power supply voltage was impressed, and it is characterized by composition possessing a drive transistor which drives a driven element, and a capacitative element by which an end was connected to a gate of said drive transistor. Also in which composition, while compensating variation in a drive transistor, it becomes possible to reduce one transistor.

Here, said 1st power supply voltage and said 2nd power supply voltage are omitted, and are, and their things are desirable.

Various electronic devices, such as an electro-optic device, memory storage, and a sensor unit, may be constituted using at least one above-mentioned unit circuit. For example, if the above-mentioned unit circuit is used as a pixel circuit, it is possible to constitute an electro-optic device. Such an electro-optic device may be mounted in electronic equipment.

[0012]

To achieve the above objects, this invention is two or more unit circuits an electronic circuit to include, and each of two or more of said unit circuits, A drive transistor containing the 1st terminal and 2nd terminal and a compensation transistor to which said 3rd terminal was connected at a gate of said drive transistor including the 3rd terminal and 4th terminal, A switching transistor by which said 5th terminal was connected to a gate and said 3rd terminal of said drive transistor including the 5th terminal and 6th terminal, While holding charge quantity according to current which flows via said compensation transistor and said switching transistor, A capacitative element to which an end was connected at a gate of said drive transistor is included, Said 4th terminal is connected to the 1st power source wire with said 4th terminal of others and a unit circuit among said two or more unit circuits, It is connected to the 2nd power source wire, and said 2nd terminal is characterized by composition provided with a control circuit which sets said 1st power source wire as two or more potential, or controls cutting and connection between said 1st power source wire and power supply potential. According to this composition, threshold voltage of a drive transistor can be compensated with simple composition.

In this electronic circuit, no transistors other than said drive transistor, said compensation transistor, and said switching transistor exist in each of said unit circuit. therefore, the number of a transistor to be used is reduced by one piece compared with the conventional thing, compensating threshold voltage of a drive transistor -- things can be carried out.

As for said compensation transistor, that gate is connected to said 3rd terminal in this electronic circuit. Therefore, current which flows through a drive transistor is controllable by voltage charged by capacitative element.

In this electronic circuit, a conductivity type of said drive transistor and said compensation transistor is the same. According to this, a drive transistor can be compensated easily.

An electronic device is connected to said 1st terminal in this electronic circuit. Since threshold voltage of a drive transistor is compensated, a current value which flows into an electronic device is controllable with sufficient accuracy. As an electronic device, it is a driven element by which a current drive is carried out.

In this electronic circuit, said control circuit is a transistor containing the 7th terminal and 8th terminal, said 7th terminal is connected to a power supply, and said 8th terminal is connected to said 1st power source wire. According to this, a control circuit can be constituted easily.

a period when current is flowing via said compensation transistor and said switching transistor

in this electronic circuit -- potential of said 1st power source wire and said 2nd power source wire at least is set up become same electric potential substantially. According to this, voltage almost equal to threshold voltage of a drive transistor generated by a compensation transistor can be certainly supplied to a gate of this drive transistor.
In this electronic circuit, said 1st power source wire and said 2nd power source wire can electrically connect with a power supply which has same electric potential. According to this, voltage supplied to the 1st power source wire and 2nd power source wire can be made easy almost equal.
Threshold voltage of said drive transistor is set up in this electronic circuit not become higher than threshold voltage of said compensation transistor. According to this, threshold voltage of a drive transistor can be compensated certainly.
In this electronic circuit, larger composition of a current amount which flows into said compensation transistor than a current amount controlled by said drive transistor is preferred. According to this composition, when one [a switching transistor], it becomes possible to accumulate promptly an electric charge according to a current amount which flows into switching transistor concerned and a compensation transistor in a capacitative element.
Various electronic devices, such as an electro-optic device, memory storage, and a sensor unit, may be constituted using at least one above-mentioned electronic circuit.
[0013]
This invention is two or more unit circuits the electro-optic device which it had, and each of two or more of said unit circuits, A drive transistor containing the 1st terminal and 2nd terminal and a compensation transistor to which said 3rd terminal was connected at a gate of said drive transistor including the 3rd terminal and 4th terminal, A switching transistor by which said 5th terminal was connected to a gate and said 3rd terminal of said drive transistor including the 5th terminal and 6th terminal, Charge quantity according to current which flows via an electrooptics element connected to said 1st terminal, and said compensation transistor and said switching transistor is held, The 1st power source wire connected to said 4th terminal including a capacitative element to which an end was connected at a gate of said drive transistor, Common connection is carried out also to said 4th terminal of other at least one unit circuit among said two or more unit circuits, it is connected to the 2nd power source wire, and said 2nd terminal is provided with a control circuit which sets said 1st power source wire as two or more potential, or controls cutting and connection between said 1st power source wire and power supply potential. Since one transistor used compared with the conventional thing is reduced according to this, compensating threshold voltage of a drive transistor, a numerical aperture is raised and it becomes possible for display quality to be high and to carry out. Since the number of transistors which constitute a unit circuit can be reduced by one piece compared with the conventional thing, a yield can be raised.

In this electro-optic device, said electrooptics element is an organic EL device. According to this, ****** is high by reducing one transistor used compared with the conventional thing, and luminance gradation of an organic EL device can be controlled with sufficient accuracy.
In this electro-optic device, said control circuit is a transistor containing the 7th terminal and 8th terminal, said 7th terminal is connected to a power supply, and said 8th terminal is connected to said 1st power source wire. A unit which reduced one transistor used compared with the conventional thing can be constituted easily, compensating threshold voltage of a drive transistor.
In this electro-optic device, potential of said 1st power source wire and said 2nd power source wire at least is set up during the period when current is flowing via said compensation transistor and said switching transistor become same electric potential substantially. According to this, voltage almost equal to threshold voltage of a drive transistor generated by a compensation transistor can be certainly supplied to a gate of the drive transistor. In this electro-optic device, said 1st power source wire and said 2nd power source wire can electrically connect with a power supply which has same electric potential. According to this, voltage supplied to the 1st power source wire connected to a unit circuit and the 2nd power source wire can be made easy almost equal.
Threshold voltage of said drive transistor is set up in this electro-optic device not become higher than threshold voltage of said compensation transistor. According to this, threshold voltage of a drive transistor can be compensated certainly. Therefore, luminance gradation of an electrooptics element is controllable with sufficient accuracy.
[0014]
A unit circuit where this invention has been arranged corresponding to each intersection of two or more scanning lines, two or more data lines, and a scanning line of said plurality and said two or more data lines, respectively, Are two or more 1st power source wires an included electro-optic device, and each of said unit circuit, A drive transistor containing the 1st terminal and 2nd terminal and a compensation transistor to which said 3rd terminal was connected at a gate of said drive transistor including the 3rd terminal and 4th terminal, A switching transistor by which said 5th terminal was connected to a gate and said 3rd terminal of said drive transistor including the 5th terminal and 6th terminal, Charge quantity according to a current value which flows via an electrooptics element connected to said 1st terminal, and said compensation transistor and said switching transistor is held, A capacitative element to which an end was connected at a gate of said drive transistor is included, Common connection of the gate of a switching transistor contained in a series of unit circuits is carried out to one scanning line, Common connection of the 4th terminal in said a series of unit circuits is carried out to the 1st one power source wire, and it is provided with a control circuit which sets each of said 1st power source wire as two or more potential, or controls cutting and connection between the 1st

one power source wire and power supply potential. Since one transistor used compared with the conventional thing is reduced compensating threshold voltage of all the drive transistors provided in a unit circuit according to this, a numerical aperture is raised and it becomes possible for display quality to be high and to carry out. Since the number of transistors which constitute a unit circuit can be reduced by one piece compared with the conventional thing, a yield can be raised.

In this electro-optic device, common connection of the 2nd terminal in said a series of unit circuits is carried out to the 2nd one power source wire. According to this, it becomes possible for display quality to be high and to carry out.

A gate of said compensation transistor is connected to the 3rd self terminal in this electro-optic device. According to this, voltage almost equal to threshold voltage of a drive transistor generated by a compensation transistor can be certainly supplied to a gate of the drive transistor.

In this electro-optic device, said electrooptics element is an organic EL device. According to this, luminance gradation of an organic EL device is controllable with sufficient accuracy. In this electro-optic device, an electrooptics element of the same color was arranged along said scanning line. According to this, a numerical aperture can be raised further.

[0015]

A drive transistor in which this invention contains the 1st terminal and 2nd terminal, and a compensation transistor by which said 3rd terminal was connected to a gate of said drive transistor including the 3rd terminal and 4th terminal, A switching transistor by which said 5th terminal was connected to a gate and said 3rd terminal of said drive transistor including the 5th terminal and 6th terminal, An end a unit circuit containing a connected capacitative element to a gate of said drive transistor Two or more preparations, The 4th terminal in a series of unit circuits is a drive method of an electronic circuit by which common connection was carried out to the 1st power source wire, By making into an ON state each of a switching transistor which carries out the electrical link of each of the 4th terminal of said a series of unit circuits to prescribed potential, and is contained in said a series of unit circuits, Hold charge quantity according to current which flows via said compensation transistor to a capacitative element, and voltage according to said charge quantity is impressed to said drive transistor, A step which sets up switch-on between said 1st terminal and said 2nd terminal, and a step which separates electrically each of the 4th terminal of said a series of unit circuits from said prescribed potential are included. According to this, threshold voltage of a drive transistor can be compensated and an electronic circuit can be made to drive.

[0016]

A drive transistor in which this invention contains the 1st terminal and 2nd terminal, and a compensation transistor by which said 3rd terminal was connected to a gate of said drive

transistor including the 3rd terminal and 4th terminal, A switching transistor by which said 5th terminal was connected to a gate and said 3rd terminal of said drive transistor including the 5th terminal and 6th terminal, A unit circuit containing an electrooptics element connected to said 1st terminal and a capacitative element to which an end was connected at a gate of said drive transistor, Corresponding to each intersection of two or more scanning lines and two or more data lines, it is arranged, respectively, Common connection of the gate of a switching transistor contained in a series of unit circuits is carried out to one scanning line, The 4th terminal in said a series of unit circuits is a drive method of an electro-optic device by which common connection was carried out to the 1st one power source wire, Supply a scanning signal to a gate of a switching transistor which carries out the electrical link of each of the 4th terminal of said a series of unit circuits to prescribed potential, and is contained in said a series of unit circuits, respectively, and as an ON state, Charge quantity according to a current level of current which flows into a period electrically connected with the data line with which said two or more data lines correspond via said compensation transistor is held to a capacitative element, Voltage according to said charge quantity is impressed to said 1st gate, and a step which sets up switch-on between said 1st terminal and said 2nd terminal, and a step which separates electrically each of the 4th terminal of said a series of unit circuits from said prescribed potential are included. According to this, threshold voltage of a drive transistor can be compensated and an electro-optic device can be made to drive.

[0017]

Since electronic equipment of this invention mounts the above-mentioned electronic circuit or the above-mentioned electro-optic device, Since threshold voltage of a drive transistor in a circuit can be compensated and also one transistor used compared with the conventional thing can be reduced, a yield of electronic equipment can be raised.

[0018]

[Embodiment of the Invention]

Hereafter, the embodiment of this invention is described with reference to drawings.

[0019]

<A 1st embodiment>

First, a 1st embodiment of this invention is described. Drawing 1 is a figure showing the composition of the electro-optic device with which the unit circuit concerning a 1st embodiment is applied. In [as shown in this figure] this electro-optic device, While being allocated so that two or more scanning line (S1, S2, S3, ...) and two or more data lines (D1, D2, D3, ...) may cross mutually, the pixel circuit 20 which is an example of the unit circuit concerning this embodiment is established in each of the intersection at matrix form, respectively.

The scanning line driving circuit 130 receives without the scanning line S1, S2, S3, and ...., and impresses the selection potential Vsel to predetermined timing, respectively. The data line

driving circuit 140 receives without the data line D1, D2, D3, and ...., and supplies data-currents Idata as a data signal, respectively.
In drawing 1, the power source wire V mentioned later is omitted. In this explanation, the pixel circuit 20 may call a display panel the portion arranged to matrix form. In this embodiment, although one of the pixels which should be displayed supports the one pixel circuit 20, it is good also as composition which displays one pixel by two or more sub pixels.
[0020]
Drawing 2 (a) is a circuit diagram showing the detailed composition of the pixel circuit 20 as a unit circuit concerning this embodiment. The pixel circuit in this figure is one of the things corresponding to intersection with the general scanning line S and data-line D.
In this figure, the driven element L is an organic EL device by which a current drive is carried out, for example, and it has written as a diode with this figure. This unit circuit besides the driven element L Drive transistor Tr1, switching transistor Tr2 (the 2nd switching transistor), The capacitative element C which accumulates switching transistor Tr3 (the 1st switching transistor), compensation transistor Tr4, and an electric charge is included. Among these, each of drive transistor Tr1 and compensation transistor Tr4 is p channel type thin film transistors with little degradation with the passage of time (Thin Film Transistor:TFT), and switching transistor Tr2 and Tr3 are n channel type TFT(s).
[0021]
Selection of whether to use a p channel type or which an n channel type conductivity type for each transistor is not necessarily restricted to what was shown here. About switching transistor Tr2 and Tr3 conductivity type (is it an n channel type or is a p channel type?), it may differ mutually. However, to change the conductivity type of switching transistor Tr2 and Tr3 mutually, it is necessary to form separately the scanning line which takes a logical level with this exclusive in addition to the scanning line S, and to connect the gate of the switching transistor which takes a p channel type.
[0022]
While one end of the driven element L is connected to the drain of drive transistor Tr1 via the electrode for hole injections which is not illustrated, the other end of the driven element L is connected to the negative pole E.
While the sauce of drive transistor Tr1 is connected to the power source wire V, the gate is connected to the end of the capacitative element C, the drain of switching transistor Tr3, and the drain of transistor Tr4, respectively. The other end of the capacitative element C is connected to the power source wire V.
The drain of compensation transistor Tr4 is connected to the self gate. Therefore, compensation transistor Tr4 is diode connection.
[0023]

The drain and gate of compensation transistor Tr4, It is connected to the end (the gate of drive transistor Tr1, the drain of switching transistor Tr3) of the capacitative element C, and the sauce of compensation transistor Tr4 is connected to the sauce of switching transistor Tr2. The drain of switching transistor Tr2 is connected to the power source wire V. The sauce of switching transistor Tr3 is connected to data-line D, and the gate of switching transistor Tr2 and Tr3 is connected to the scanning line S, respectively.

[0024]

Below, operation of the unit circuit of drawing 2 (a) is explained. On-off control of switching transistor Tr2 and Tr3 is carried out by the selection potential Vsel impressed to each gate via the scanning line S. In this embodiment, since both switching transistor Tr2 and Tr3 are n channel types, when the selection potential Vsel is high-level, they become one here, respectively. Since the gate of compensation transistor Tr4 and the potential of sauce will become equal if data-currents Idata is supplied via data-line D when switching transistor Tr2 and Tr3 are in the state of one, it is at compensation transistor Tr4,

Vgs(potential difference of gate and sauce) =Vds (potential difference of a drain and sauce)

The capacitative element C stores electricity the electric charge corresponding to a next door and this state, and, thereby, the voltage between terminals of the capacitative element C is impressed to the gate of drive transistor Tr1. That is, the gate voltage of drive transistor Tr1 will be controlled by quantity of data-currents Idata supplied from data-line D, the current amount between the drain sauce of drive transistor Tr1 will be controlled by this, and the value of the current Ids which flows through the driven element L will be controlled.

[0025]

In the above-mentioned circuit, drive transistor Tr1 and compensation transistor Tr4, What is called a current mirror circuit is constituted, and the value of the current Ids between the drain sauce of drive transistor Tr1, i.e., the value of the current supplied to the driven element L, is proportional to the current amount between the drain sauce of compensation transistor Tr4. The ratio of the current Ids between the drain sauce of drive transistor Tr1 and data-currents Idata which flows between the drain sauce of compensation transistor Tr4 becomes settled with the characteristic of drive transistor Tr1 and compensation transistor Tr4. By therefore, the thing for which the gain coefficient (current amount which flows into the transistor when fixed voltage is impressed to the gate and sauce of a transistor) which is one of the characteristics of drive transistor Tr1 and compensation transistor Tr4 is coincided. The current Ids which flows into drive transistor Tr1, and data-currents Idata which flows through compensation transistor Tr4 can be coincided. In this embodiment, since direct continuation especially of the drain of compensation transistor Tr4 is carried out to the gate of drive transistor Tr1, Data-currents Idata which passes compensation transistor Tr4 is directly reflected in the current Ids controlled by a drive transistor, and both conformity can be improved.

[0026]
For this reason, if a display panel is constituted so that it may be in agreement in the gain coefficient of drive transistor Tr1 and compensation transistor Tr4, Even if variation occurs in drive transistor Tr1 currently formed for every pixel of a display panel even if, the current Ids of the same size as the driven element L contained in each pixel of a display panel can be supplied. Therefore, the luminosity unevenness resulting from the characteristic variation of drive transistor Tr1 can be suppressed.
[0027]
In the manufacturing process of the display panel containing the driven element L, it is easy to coincide the characteristic of the approaching transistor mutually as known well. As mentioned above, in this embodiment, direct continuation of the drain of compensation transistor Tr4 is carried out to the gate of drive transistor Tr1, and it is close to a forge fire. For this reason, in the same pixel circuit, it is not difficult to constitute the gain coefficient of drive transistor Tr1 and compensation transistor Tr4 so that it may be in agreement, therefore it is comparatively easy to manufacture a display panel with little luminosity unevenness.
[0028]
Although the gate voltage of drive transistor Tr1 is set up in this embodiment according to data-currents Idata supplied by the data line driving circuit 140, Since drive transistor Tr1 and compensation transistor Tr4 constitute what is called a current mirror circuit, stabilizing also becomes change of the current Ids between the drain sauce of drive transistor Tr1 by a temperature change etc. being controlled, and planned.
[0029]
Although compensation transistor Tr4 is made to intervene between switching transistor Tr2 and switching transistor Tr3, it may be made to make it intervene between switching transistor Tr2 and the power source wire V in the circuit of drawing 2 (a), as shown in drawing 2 (b). Also in this circuit, the current Ids between drain sauce of drive transistor Tr1 of becoming settled by data-currents Idata which flows through compensation transistor Tr4 is the same as that of the circuit shown in drawing 2 (a).
[0030]
Drawing 3 is a timing chart for explaining operation of the unit circuit shown in drawing 2 (a). First, while the scanning line driving circuit 130 makes high-level selection potential Vsel supplied to the scanning line S, the data line driving circuit 140 supplies data-currents Idata to data-line D.
Since both switching transistor Tr2 and Tr3 will be turned on if the selection potential Vsel becomes high-level, data-currents Idata, It flows in the course the power source wire V, switching transistor Tr2, compensation transistor Tr4, switching transistor Tr3, and data-line D. While the gate voltage of drive transistor Tr1 is defined, the current Ids according to this gate

voltage is supplied from the power source wire V according to this data-currents Idata and the driven element L emits light, this gate voltage is held by the capacitative element C. Therefore, since the current Ids according to the held gate voltage continues flowing into the driven element L even if the selection potential Vsel is set to a low level and both switching transistor Tr2 and Tr3 are turned off, The luminescent state of the driven element L will be maintained until the selection potential Vsel becomes high-level again next time.

[0031]

By the way, the gain coefficient of drive transistor Tr1 and compensation transistor Tr4 which constitute the current mirror circuit, As mentioned above, when it coincides this, it is not restricted, but according to the demand of versatility, such as size of the display panel in which this unit circuit is applied, and scan frequency, it can set up suitably.

For example, it is good also as composition which made the gain coefficient of compensation transistor Tr4 larger than the gain coefficient of drive transistor Tr1. Since the current Idata which flows into compensation transistor Tr4 becomes larger than the current Ids which flows into drive transistor Tr1 according to such composition, the time which a charge storage takes in the capacitative element C can be shortened. For this reason, it becomes possible to cope with high-frequency-ization of the scan frequency demanded with increase of the pixel number of a display panel, or large-size-izing.

Contrary to this, it is good also as composition which made the gain coefficient of compensation transistor Tr4 smaller than the gain coefficient of drive transistor Tr1. Since data-currents Idata by compensation transistor Tr4 becomes smaller than the current Ids by drive transistor Tr1 according to this composition, the electric power consumed in the case of the charge storage in the capacitative element C can be stopped.

[0032]

In drawing 2 (a) or drawing 2 (b), the gate of switching transistor Tr2 in the pixel circuit 20 of the same line and Tr3 had become the composition mutually connected to the same scanning line S. It is good also as composition connected to the scanning line S with which it is not restricted to this composition, a different scanning line from the scanning line S is formed, namely, two scanning lines per line are formed, and the gates of switching transistor Tr2 and Tr3 differ mutually. If both composition is compared, the direction of composition (composition which has one scanning line per pixel circuit 20 of one line) of starting the former compares with the composition (composition which has two scanning lines per pixel circuit 20 of one line) concerning the latter here, Since there are few fields which wiring takes and they end, improvement in the numerical aperture by securing an effective optical surface product becomes easy.

[0033]

Next, the manufacturing process of TFT and a pixel is explained about the manufacturing

process in the above-mentioned pixel circuit 20.
First, by PECVD which used SiH_4 on the glass substrate 1, and LPCVD using Si_2H_6, while forming an amorphous silicon, This amorphous silicon is made to polycrystal-ize with laser radiation, such as an excimer laser, and solid phase growth, and the polycrystalline silicon layer 2 is formed (refer to drawing 4 (a)).
After patterning the polycrystalline silicon layer 2 and forming the gate dielectric film 3, the gate 4 is formed further (refer to drawing 4 (b)).
Then, impurities, such as Lynn and boron, are driven into the polycrystalline silicon layer 2 in self align, using the gate 4 as a mask, and the transistors 5a and 5b are formed. Here, the conductivity types of the transistors 5a and 5b are a p type and a n type, respectively. After forming the 1st interlayer insulation film 6, a contact hole is punctured and sauce and the drain 7 are formed further (refer to drawing 4 (c)).
And after forming the 2nd interlayer insulation film 8, a contact hole is punctured and the picture element electrode 9 which consists of ITO(s) (Indium Tin Oxide) further is formed (refer to drawing 4 (d)).
[0034]
The adhesion layer 10 is formed and an opening is formed corresponding to a luminous region so that the 2nd interlayer insulation film 8 and the picture element electrode 9 which were formed in this way may be covered. The layer intermediate layer 11 is formed and, similarly an opening is formed corresponding to a luminous region (refer to drawing 5 (a)).
Next, the wettability of a substrate face is controlled by plasma treatment, such as oxygen plasma and CF_4 plasma. Then, the hole injection layer 12 and the luminous layer 13 are formed according to a liquid phase process or a vacuum process, respectively. A spin coat, squeegee coating, an ink jet process, etc. are mentioned to a liquid phase process, and sputtering, vacuum evaporation, etc. are mentioned to a vacuum process. The negative pole 14 having contained metal, such as aluminum, is formed. Finally, the sealing layer 15 is formed and an organic EL device is completed (refer to drawing 5 (b)).
Here, there is a role of the adhesion layer 10 in improving the adhesion of a substrate and the layer intermediate layer 11, and obtaining an exact emission area. When the layer intermediate layer's 11 role forms the hole injection layer 12 and the luminous layer 13 in keeping away the negative pole 14 from the gate 4, sauce, and the drain 7, and reducing parasitic capacitance, and a liquid phase process, there is in controlling surface wettability and being able to be made to perform exact patterning. An electron transport layer (not shown) may be provided on the luminous layer 13.
[0035]
<A 2nd embodiment>
By forming in a 1st embodiment mentioned above, so that the gain coefficient of drive

transistor Tr1 and compensation transistor Tr4 may become the same for example, The current Ids between the drain sauce of drive transistor Tr1 was able to be coincided with data-currents Idata which flows between the drain sauce of compensation transistor Tr4. For this reason, even if characteristic variation occurred in drive transistor Tr1, the current Ids of the same size as the driven element L could be supplied over each pixel, and it became possible to suppress the luminosity unevenness resulting from the characteristic variation of a drive transistor.

However, in a 1st embodiment, in one pixel, a total of four transistors are required so that clearly from drawing 2 (a) or drawing 2 (b). For this reason, when it sees as a display panel, only the part of the number of transistors tends to cause the fall of the yield, and decline in a numerical aperture.

Then, after suppressing the luminosity unevenness resulting from the characteristic variation of drive transistor Tr1, a 2nd embodiment that decreased the number of the transistor which is needed in one pixel will be described.

[0036]

Drawing 6 is a block diagram showing the composition of the organic electroluminescence display to which the unit circuit concerning a 2nd embodiment is applied.

As shown in this figure, the organic electroluminescence display 100 is provided with the signal generating circuit 110, the display panel part 120, the scanning line driving circuit 130, the data line driving circuit 140, and the power source wire control circuit 150.

The signal generating circuit 110 in the organic electroluminescence display 100, the scanning line driving circuit 130, the data line driving circuit 140, and the power source wire control circuit 150 may be constituted by the electronic parts in which each became independent. For example, the signal generating circuit 110, the scanning line driving circuit 130, the data line driving circuit 140, and the power source wire control circuit 150 may be respectively constituted by the semiconductor integrated circuit device of one chip. All or some of the signal generating circuit 110, the scanning line driving circuit 130, data line driving circuit 140, and power source wire control circuits 150 may comprise a programmable IC chip, and the function may be realized by software by the program written in the IC chip concerned.

[0037]

The signal generating circuit 110 creates the scanning-controls signal and data control signal for displaying a picture on the display panel part 120 based on the image data from the external device which is not illustrated. And the signal generating circuit 110 outputs said data control signal to the data line driving circuit 140 while outputting said scanning-controls signal to the scanning line driving circuit 130. The signal generating circuit 110 outputs a timing control signal to the power source wire control circuit 150.

[0038]

Drawing 7 is a figure showing the internal configuration of the display panel part 120 and the data line driving circuit 140. As shown in this figure, the display panel part 120, It has the pixel circuit 200 as a unit circuit, respectively in the position corresponding to the intersection of the data line Xm (m= 1 - M;m are integers) of M book prolonged along a column direction, and the scanning line Yn (n= 1 - N;n are integers) of N book prolonged along with a line writing direction. That is, by being connected to the data line Xm prolonged along a column direction, and the scanning line Yn prolonged along with a line writing direction, respectively, each pixel circuit 200 is arranged to matrix form, and constitutes the electronic circuit.
Along with the line writing direction (the installation direction of a scanning line), the 1st power source wire L1 and 2nd power source wire L2 are provided, respectively for every line.
[0039]
The pixel circuit 200 contains the driven element L of a 1st embodiment, and the same organic EL device 210. The pixel circuit 200 for one line is connected to the 1st power source wire L1 and 2nd power source wire L2 corresponding to the line concerned. That is, the pixel circuit 200 for one line is sharing the 1st power source wire L1 and 2nd power source wire L2 of each other.
Although the 1st power source wire L1 in each line is indirectly connected to voltage supply line VL via the transistor Q here, respectively, it is directly connected to voltage supply line VL, respectively, and the 2nd power source wire L2 in each line has composition which supplies the driver voltage Vdd to the pixel circuit 200.
The scanning line driving circuit 130 supplies the scanning signal which shows the selection to the selected scanning line while choosing one scanning line at a time in order among two or more scanning lines Yn according to the scanning-controls signal outputted from the signal generating circuit 110.
The data line driving circuit 140 is provided with the line driver 230 for [of the data line / every], and the one line driver 230 is connected to the end of the data line corresponding to it. Here, based on the data control signal outputted from the signal generating circuit 110, the line driver 230 generates data-currents Idata, and supplies it to the corresponding data line.
Speaking generally, the line driver 230 of eye m sequence supplying data-currents Idata which directs the luminosity of the organic EL device 210 contained in the pixel circuit 200 located in an n line m sequence to the data line Xm of eye m sequence, when the scanning line Yn of eye n line is chosen.
In the pixel circuit 200, if an internal state is set up according to data-currents Idata supplied to the corresponding data line mention later, it has composition by which the driving current Ids supplied to the organic EL device 210 according to this internal state is controlled.
[0040]
The power source wire control circuit 150 supplies a power source wire control signal to the

power source wire control line F formed for every line, respectively, and controls turning on and off of the transistor Q of each line. In detail, the power source wire control circuit 150 is generated so that it may be thoroughly in agreement with the scanning signal which shows selection of the scanning line of the line concerned about the power source wire control signal of a certain line based on the scanning-controls signal outputted from the signal generating circuit 110, Or it generates so that the selective state may overlap in part in time, and the power source wire control line F corresponding to the line concerned is supplied.

[0041]

Drawing 8 is a circuit diagram showing the detailed composition of the pixel circuit 200 as a unit circuit concerning a 2nd embodiment. In this figure, the thing corresponding to intersection with the scanning line Yn of eye n line and the data line Xm of eye m sequence is illustrated among each pixel circuit 200.

As shown in drawing 8, the pixel circuit 200 contains three transistors and one capacitative element. In detail, the pixel circuit 200 contains drive transistor Trd, compensation transistor Trc, the switching transistor Trs, and the capacitor C1 for maintenance as a capacitative element.

Although the conductivity type of the drive transistor Trd and the compensation transistor Trc is a p type (p channel), respectively and the conductivity type of the switching transistor Trs is a n type (n channel) in this embodiment, About selection of these conductivity types, it is not restricted to what was shown here. The transistor contained in the pixel circuit 200 is usually formed by TFT (thin film transistor).

[0042]

The drain (the 1st terminal) of the drive transistor Trd is connected to the anode of the organic EL device 210. The negative pole of the organic EL device 210 is grounded. The sauce (the 2nd terminal) of the drive transistor Trd is connected to the 2nd power source wire L2. The 2nd power source wire L2 is connected to voltage supply line VL provided in the right end side of the display panel part 120. The gate (the 1st gate) of the drive transistor Trd is connected to the node N. The node N is a node of the gate of the drive transistor Trd, the end of the capacitor C1 for maintenance, the drain of the switching transistor Trs, and the drain of the compensation transistor Trc. The other end of the capacitor C1 for maintenance is connected to the sauce L2 of the drive transistor Trd, i.e., the 2nd power source wire.

[0043]

The drain (the 6th terminal) of the switching transistor Trs is connected with the data line Xm, and the drain (the 5th terminal) is connected to the node N. The gate of the switching transistor Trs is connected to the scanning line Yn. Therefore, if the scanning signal which shows that the scanning line Yn concerned was chosen as the scanning line Yn is supplied, the switching transistor Trs will be in switch-on (if it becomes high-level).

[0044]
Not only the drain (the 3rd terminal) of the compensation transistor Trc but its gate is connected to the node N. The sauce (the 4th terminal) of the compensation transistor Trc is connected to the 1st power source wire L1. Therefore, the compensation transistor Trc functions as a diode which makes a forward direction from the 1st power source wire L1 to the node N.
The transistor by which arrangement formation is carried out into each pixel circuit 200 usually comprises TFT (thin film transistor).
[0045]
The 1st power source wire L1 is connected to voltage supply line VL via the transistor Q as a control circuit. The power source wire L comprises the 1st power source wire L1 and 2nd power source wire L2.
The gate of the transistor Q is connected to the power source wire control line F. The transistor Q will be from the power source wire control circuit 150 according to the power source wire control signal supplied via the power source wire control line F in either the state (OFF state) of electric cutting, or the state (ON state) of an electrical link. Since the conductivity type of the transistor Q is a p type (p channel), when a power source wire control signal is set to a low level, the transistor Q will be in an ON state.
[0046]
Next, the drive method of the pixel circuit 200 in the organic electroluminescence display 100 is explained with reference to drawing 9. Drawing 9 is a timing chart for explaining this drive method.
First, in data writing period Trp, if the scanning signal which shows selection of the scanning line Yn is supplied by the scanning line driving circuit 130, the switching transistor Trs will be in an ON state (if the scanning line Yn becomes high-level). Since the power source wire control signal of a low level which makes the transistor Q an ON state is supplied to the power source wire control line F to compensate for supply of such a scanning signal, in data writing period Trp, the transistor Q will be in an ON state.
Therefore, current flows in the course of voltage supply line VL, the transistor Q, the 1st power source wire L1, compensation transistor Trc, the switching transistor Trs, and the data line Xm. The current which flows at this time is data-currents Idata generated by the line driver 230, i.e., data-currents Idata which directs the luminosity of the organic EL device 210 contained in the pixel circuit 200 of an n line m sequence.
And while voltage VC1 according to data-currents Idata which flows at this time occurs in the node N and it is held at the capacitor C1 for maintenance, it is impressed by the gate of the drive transistor Trd. For this reason, the driving current Ids flows into the transistor Trd for a drive, and the organic EL device 210 begins to emit light.

[0047]
Next, if data writing period Trp is completed and it continues till the light emission period Tel, the scanning line Yn will be set to a low level. For this reason, the switching transistor Trs will be in an OFF state. Since a power source wire control signal changes high-level according to a change state, in the transistor Q, such a scanning signal will be in an OFF state. Even if both the switching transistor Trs and the transistor Q will be in an OFF state, in the gate of the drive transistor Trd. Since voltage VC1 held by the capacitor C1 for maintenance is impressed, the luminescent state of the organic EL device 210 will be maintained until the scanning line Yn is chosen again next time (until the transistor Q is turned on again).
[0048]
Such operation is simultaneously performed also in each of the pixel circuit 200 for one line corresponding to the scanning line Yn, respectively. If it sees about the whole pixel circuit 200, it will perform in order about the scanning line of 1, 2, 3, --, eye N line.
Driving period Tc comprises data writing period Trp and the light emission period Tel. The luminosity of the organic EL device 210 means the cycle updated 1 time respectively, and this driving period Tc has it. [synonymous with what is called a frame period (vertical scanning period)]
[0049]
In order to explain the movement mechanism of the above-mentioned pixel circuit briefly, supposing it expresses in consideration of threshold voltage Vth2 of the transistor Trc for compensation, the potential Vn in said node N, It is expressed with the value adding voltage VC1 produced in the capacitor C1 for maintenance, and the value (Vn=Vdd-Vth2) which deducted threshold voltage Vth2 of the transistor Trc for compensation from the driver voltage Vdd. That is, it is expressed with a following formula (1).
Vg=VC1+Vdd-Vth2 -- (1)
[0050]
Since it is a difference (Vg-Vs) of the gate potential Vg and the source potential Vs (=Vdd) of the transistor Trd for a drive, the voltage Vgs between gate sauce of the drive transistor Trd can change the voltage Vgs between gate sauce of a drive transistor like a following formula (2).
Vgs=Vg-Vs -- (2)
[0051]
Substitution of Vg and Vs (=Vdd) which are shown in this formula (2) by a formula (1) will obtain a following formula (3).

$$Vgs = VC1 + Vdd - Vth2 - Vdd$$
$$= VC1 - Vth2 \quad \cdots(3)$$

[0052]
Here, as mentioned above, if almost equal to threshold voltage Vth1 of the drive transistor Trd, the voltage Vgs between gate sauce shown by a formula (3) can express threshold voltage Vth2 of the compensation transistor Trc like a following formula (4).
Vgs=VC1-Vth1 -- (4)
[0053]
On the other hand, the current Ids which flows between the source drains of the drive transistor Trd is expressed with a following formula (5).
Ids=(1/2) beta(-Vgs-Vth1) ^{2} -- (5)
[0054]
beta in this formula is a gain coefficient,
beta= (muAW/L)
It is come out and shown. Here, as for mu, the mobility of a career and A show gate capacitance, W shows channel width, and L shows channel length, respectively.
If Vgs shown in a formula (5) by a formula (4) is substituted,

$$Ids = (1/2)\ \beta\ (-VC1+Vth1-Vth1)^2$$
$$= (1/2)\ \beta\ (-VC1)^2 \quad \cdots(6)$$

[0055]
The current Ids which flows between the source drains of the drive transistor Trd is determined only by voltage VC1 produced in the capacitor C1 for maintenance so that it may understand, even if it sees this formula (6).
[0056]
It is easy to arrange the threshold characteristics etc. of the transistor which generally approaches mutually. For this reason, since it is also easy to arrange the threshold voltage characteristic of the compensation transistor Trc and the drive transistor Trd like the same pixel circuit which approaches extremely, The driving current Ids which flows into the organic EL device 210 can be determined by data-currents Idata, without being dependent on the threshold voltage characteristic of the drive transistor Trd.
Namely, also in a 2nd embodiment, since direct continuation of the drain of the compensation transistor Trc is carried out to the gate of the drive transistor Trd, As a result of approaching, while it is easy to arrange the characteristic of both transistors, data-currents Idata which passes the compensation transistor Trc is directly reflected in the current Ids controlled by the drive transistor Trd, and both conformity can be improved.

[0057]
Therefore, since the current Ids which flows into the organic EL device 210 is not affected even if the threshold voltage of the drive transistor Trd is different by variation every pixel circuit 200 in the display panel part 120, It becomes possible like a 1st embodiment of the above to suppress the luminosity unevenness resulting from the characteristic variation of a drive transistor.
[0058]
In a 2nd embodiment, the number of the transistors formed in the one pixel circuit 200 is three, and they can be lessened one piece as compared with four of the pixel circuit 20 of a 1st embodiment. For this reason, while being able to suppress the yield lowering by the defect of a transistor in addition to the point that the luminosity unevenness resulting from the characteristic variation of a drive transistor can be suppressed according to a 2nd embodiment, it becomes possible to secure the effective area product per pixel and to raise a numerical aperture.
[0059]
Also in a 2nd embodiment, it may set up suitably like a 1st embodiment. For example, it is good also as composition which made the gain coefficient of the compensation transistor Trc larger than the gain coefficient of the drive transistor Trd. Since the current Idata which flows into the compensation transistor Trc becomes larger than the current Ids which flows into the drive transistor Trd according to such composition, the time which a charge storage takes in the capacitative element C can be shortened. For this reason, it becomes possible to cope with high-frequency-ization of the scan frequency demanded with increase of the pixel number of a display panel, or large-size-izing.
Contrary to this, it is good also as composition which made the gain coefficient of the compensation transistor Trc smaller than the gain coefficient of the drive transistor Trd. Since data-currents Idata by the compensation transistor Trc becomes smaller than the current Ids by the drive transistor Trd according to this composition, the electric power consumed in the case of the charge storage in the capacitative element C can be stopped.
[0060]
In a 2nd embodiment, it is preferred to be set up so that both the transistor Trs for switching and the transistor Q will be in an ON state in data writing period Trp and it may be [in / both / the light emission period Tel] in an OFF state, but it is not limited to in particular this. As for the driving current Ids, it is preferred to be set up so that it may not flow into the organic EL device 210 at data writing period Trp but may flow into the light emission period Tel, but it is not limited to in particular this.
By enlarging channel width of the compensation transistor Trc, etc. to the drive transistor Trd, Since high current can be relatively used as data-currents Idata compared with the case where

the size of the drive transistor Trd and the compensation transistor Trc is the same also when supplying the data of low gradation, time delay energizing by parasitic capacitance etc. can be controlled.

In the pixel circuit 200, it is preferred to be set up so that threshold voltage Vth1 of the drive transistor Trd may become the two or more threshold voltage Vth of the compensation transistor Trc, but it is not limited to in particular this. For example, when making the organic EL device 210 emit light also in data writing period Trp, threshold voltage Vth1 of the drive transistor Trd may be set up become lower than threshold voltage Vth2 of the transistor Trc for compensation.

the period when it adds in and a power source wire control signal is supplied, and the period which a scanning signal makes supply -- completeness -- or it is set up lap in time in part. That is, the transistor Q is set up be in an ON state in the almost same period as data writing period Trp. However, by supplying the power source wire control signal which makes the transistor Q one ahead of the scanning signal which shows selection of a scanning line, Since it can control that the voltage of the gate of the transistor Trd for a drive set up by data-currents Idata changes with driver voltages Vdd, it may be desirable.

[0061]

In drawing 7, although voltage supply line VL was provided in the right end side of the display panel part 120, Although it is not limited to this, it could provide in the left end side of the display panel part 120 and the transistor Q and voltage supply line VL were constituted as a different body in the power source wire control circuit 150, it may be made to provide in the inside of the power source wire control circuit 150.

Although the transistor Q was used as a control circuit, it may change to the transistor Q and the switch which can be switched between low voltage and high potential may be formed. In order to raise the driving ability of the transistor Trd for a drive, impedance of the 2nd power source wire L2 or voltage supply line VL may be made low enough using a voltage follower circuit including a buffer circuit and a source follower circuit.

[0062]

<Application of a 2nd embodiment>

Although the display panel shown in drawing 7 gives and explains the example which indicates by gradation in one color for simplification of explanation, when the function as a actual display panel is considered, it may be required that a colored presentation should be carried out. Then, the electro-optic device for a colored presentation is explained as an application of a 2nd embodiment.

[0063]

Drawing 10 is a block diagram showing the composition of the electro-optic device concerning this application. The electro-optic device in drawing 10 is the organic electroluminescence

display which used the organic EL device as an electrooptics element, gives the numerals same about the same members forming as drawing 7, and omits the detailed explanation.
The pixel circuit 200R for red with the organic EL device 210 with which the display panel part 120 emits a red light in drawing 10, It comprises the pixel circuit 200G for green with the organic EL device 210 which emits a green light, and the pixel circuit 200B for blue with the organic EL device 210 which emits a blue light.
[0064]
Here, in the display panel part 120, to the 1st line, the pixel circuit 200R for red arranges, the pixel circuit 200G for green arranges to the 2nd line, the pixel circuit 200B for blue arranges to the 3rd line, the pixel circuit 200R for red arranges to the 4th line, and this arrangement is repeated after that. That is, while arranging the pixel circuit of the same color by one line in accordance with the installation direction of a scanning line, the same color pixel circuit for one line is making a scanning line, the 1st power source wire L1, and the 2nd power source wire L2 serve a double purpose.
The circuitry of the pixel circuits 200R, 200G, and 200B of each color is equal to the circuitry of the pixel circuit 200 shown in drawing 8 respectively.
[0065]
Three are provided in order that a voltage supply line may supply driver voltage for exclusive use for every color in this application. That is, the voltage supply line VLR supplies the driver voltage VddR of the pixel circuit 200R for red, the voltage supply line VLG supplies the driver voltage VddG of the pixel circuit 200G for green, and the voltage supply line VLB supplies the driver voltage VddB of the pixel circuit 200B for blue.
The 1st power source wire L1 and 2nd power source wire L2 are provided for every line along with the line writing direction, respectively. Here the 1st power source wire L1 corresponding to the pixel circuit 200R for red located in the same line, When one [it is connected indirectly / the voltage supply line VLR / via the transistor QR and / the transistor QR concerned], while supplying the driver voltage VddR, it is connected directly [the voltage supply line VLR], and the 2nd power source wire L2 carries out the firm gas of the driver voltage VddR.
The same may be said of the pixel circuit 200G for green and the pixel circuit 200B for blue which are located in the same line respectively. Namely, the 1st power source wire L1 about the pixel circuit 200G for green located in the same line, When one [the transistor QG], while supplying the driver voltage VddG, the 2nd power source wire L2, When one [the 1st power source wire L1 about the pixel circuit 200G for blue which carries out the firm gas of the driver voltage VddG, and is located in the same line / the transistor QB], while supplying the driver voltage VddB, the 2nd power source wire L2 carries out the firm gas of the driver voltage VddB.
[0066]

Next, in the electro-optic device concerning an application, the drive method of the pixel circuits 200R, 200G, and 200B is explained.
First, the scanning line Y1 of the 1st line is chosen, and if the scanning signal which shows that is supplied, in each of the pixel circuit 200R for red located in the 1st line, the switching transistor Trs will be in an ON state (if the scanning line Y1 becomes high-level). Since the power source wire control signal of the 1st line is set to a low level to compensate for supply, also in the transistor QR of the 1st line, such a scanning signal will be in an ON state.
To compensate for supply of this scanning signal, data-currents Idata which directs the luminosity of the organic EL device 210 contained in the pixel circuit 200R of the 1st line is supplied to the data line of each sequence, respectively.
For this reason, in each of the pixel circuit 200R of the 1st line, the gate voltage of the drive transistor Trd is held by accumulating the electric charge according to data-currents Idata in the capacitor C1 for maintenance. Therefore, the drive transistor Trd begins to supply the driving current Ids according to the gate voltage concerned to the organic EL device 210 for red, and, thereby, luminescence of the organic EL device 210 for red starts it.
[0067]
Then, the scanning line Y2 of the 2nd line is chosen, and if the scanning signal which shows that is supplied, in each of the pixel circuit 200G for green located in the 2nd line, the switching transistor Trs will be in an ON state (if the scanning line Y2 becomes high-level). Since the power source wire control signal of the 2nd line is set to a low level to compensate for supply, also in the transistor QG of the 2nd line, such a scanning signal will be in an ON state.
To compensate for supply of this scanning signal, data-currents Idata which directs the luminosity of the organic EL device 210 contained in the pixel circuit 200G of the 2nd line is supplied to the data line of each sequence, respectively.
For this reason, in each of the pixel circuit 200G of the 2nd line, the gate voltage of the drive transistor Trd is held by accumulating the electric charge according to data-currents Idata in the capacitor C1 for maintenance. Therefore, the drive transistor Trd begins to supply the driving current Ids according to the gate voltage concerned to the organic EL device 210 for green, and, thereby, luminescence of the organic EL device 210 for green starts it.
If the scanning line Y2 of the 2nd line is chosen, in each of the pixel circuit 200R of the 1st line, both the switching transistor Trs and the transistor QR will be in an OFF state, but. Since the drive transistor Trd supplies the driving current Ids according to the gate voltage held by the capacitor C1 for maintenance to the organic EL device 210 for red, the luminescent state of the organic EL device 210 for red is maintained.
[0068]
Next, the scanning line Y3 of the 3rd line is chosen, and if the scanning signal which shows that is supplied, in each of the pixel circuit 200B for blue located in the 3rd line, the switching

transistor Trs will be in an ON state (if the scanning line Y3 becomes high-level). Since the power source wire control signal of the 3rd line is set to a low level to compensate for supply, also in the transistor QB of the 3rd line, such a scanning signal will be in an ON state.
To compensate for supply of this scanning signal, data-currents Idata which directs the luminosity of the organic EL device 210 contained in the pixel circuit 200B of the 3rd line is supplied to the data line of each sequence, respectively.
For this reason, in each of the pixel circuit 200G of the 3rd line, the gate voltage of the drive transistor Trd is held by accumulating the electric charge according to data-currents Idata in the capacitor C1 for maintenance. Therefore, the drive transistor Trd begins to supply the driving current Ids according to the gate voltage concerned to the organic EL device 210 for blue, and, thereby, luminescence of the organic EL device 210 for blue starts it.
If the scanning line Y3 of the 3rd line is chosen, in each of the pixel circuit 200R of the 2nd line, both the switching transistor Trs and the transistor QR will be in an OFF state, but. Since the drive transistor Trd supplies the driving current Ids according to the gate voltage held by the capacitor C1 for maintenance to the organic EL device 210 for green, the luminescent state of the organic EL device 210 for green is maintained.
When the same operation as henceforth is repeated [to / 4, 5, 6, --, / N line] in order, the scanning line Y1 of the 1st line will be chosen again, and data (electric charge according to data-currents Idata accumulated in the capacitor C1 for maintenance) will be rewritten.
[0069]
Thus, also in the organic electroluminescence display 100 concerning an application, the same effect as a 2nd embodiment can be acquired.
Generally, since the luminous efficiency of red and the green and blue organic EL device 210 differs mutually, there is a case which sets up the optimal value for every color of being needed, also about driver voltage. In an application, since it has composition which makes the 1st power source wire L1 and 2nd power source wire L2 share, and supplies driver voltage for every color while making the same line arrange the pixel circuit of the same color, it is easy to set up the optimal driver voltage for every color. Although the organic EL device 210 may need to carry out degradation with the passage of time etc. by prolonged luminescence and may need to reset driver voltage for every color, in an application, it becomes easy [the re set of driver voltage] for such every color.
[0070]
In a 1st and 2nd embodiment mentioned above and its application, although the pixel circuit was illustrated as a unit circuit (electronic circuit), it may apply to memory storage, such as RAM (especially MRAM). Although the organic EL device was mentioned as the example as a driven element, an inorganic EL element may be sufficient and LED and FED may be sufficient. They may be sensor elements, such as a photo detector.

[0071]

<Electronic equipment>

Some examples of the electronic equipment which applied the electro-optic device which includes the unit circuit concerning a 1st and 2nd embodiment or its application next are explained.

Drawing 11 is a perspective view showing the composition of the mobile type personal computer which applied this electro-optic device. As shown in this figure, the electro-optic device 300 including the unit circuit concerning an embodiment is used also as a display unit of the personal computer 2100. The main part 2104 of the personal computer 2100 is equipped with the keyboard 2102.

[0072]

Drawing 12 is a perspective view showing the composition of the portable telephone which applied the above-mentioned electro-optic device 300. In this figure, the portable telephone 2200 is provided with the above-mentioned electro-optic device 300 with the receiver 2204 and the speaker 2206 besides two or more manual operation buttons 2202.

[0073]

Drawing 13 is a perspective view showing the composition of the digital still camera which applied the above-mentioned electro-optic device 300 to the finder. To a film-based camera exposing a film according to the light figure of a photographic subject, the digital still camera 2300 carries out photoelectric conversion of the light figure of a photographic subject with image sensors, such as CCD (Charge Coupled Device), and generates and memorizes an imaging signal. Here, the electro-optic device 300 mentioned above is formed in the back of the main part 2302 in the digital still camera 2300. Since this electro-optic device 300 displays based on an imaging signal, it will function as a finder which displays a photographic subject. The light-receiving unit 2304 having contained an optical lens, CCD, etc. is formed in the front-face side (setting to drawing 13 the rear-face side) of the main part 2302.

[0074]

If a photography person checks the object image displayed on the electro-optic device 300 and does the depression of the shutter button 2306, the imaging signal of CCD at the time will be transmitted and memorized by the memory of the circuit board 2308.

It is in this digital still camera 2300, and the video signal output terminal 2312 for performing an external display and the input/output terminal 2314 for data communications are formed in the side of the case 2302.

[0075]

As electronic equipment by which the above-mentioned electro-optic device is applied, The personal computer shown in drawing 11, and the portable telephone shown in drawing 12, Besides the digital still camera shown in drawing 13, a liquid crystal television, ****** provided

with the videotape recorder of a viewfinder type and a monitor direct viewing type, a car navigation device, a pager, an electronic notebook, a calculator, a word processor, the workstation, the TV phone, the POS terminal, and the touch panel etc. are mentioned. And it cannot be overemphasized that the electro-optic device concerning an embodiment can be applied as an indicator of these various electronic equipment.

[0076]

[Effect of the Invention]

As explained above, according to this invention, influence of the variation in a drive transistor is made hard to be influenced, and it becomes possible to supply target current to the current type driven element of an organic EL device etc.

[Brief Description of the Drawings]

[Drawing 1]It is a block diagram showing the composition of the electro-optic device which applied the unit circuit concerning the 1st example of this invention.

[Drawing 2](a) and (b) are the figures showing the composition of the pixel circuit as a unit circuit, respectively.

[Drawing 3]It is a timing chart for explaining the drive method of the pixel circuit.

[Drawing 4](a) - (c) is a figure showing a part of manufacturing process of the electro-optic device, respectively.

[Drawing 5](a) And (b) is a figure showing a part of manufacturing process of the electro-optic device, respectively.

[Drawing 6]It is a block diagram showing the composition of the electro-optic device which applied the unit circuit concerning the 2nd example of this invention.

[Drawing 7]It is a figure showing the composition of the display panel in the electro-optic device, etc.

[Drawing 8]It is a figure showing the composition of the pixel circuit as the unit circuit.

[Drawing 9]It is a timing chart for explaining the drive method of the pixel circuit.

[Drawing 10]It is a figure showing the composition of a display panel etc. among the electro-optic devices concerning the application of a 2nd embodiment.

[Drawing 11]It is a perspective view showing the composition of the mobile type personal computer which applied the electro-optic device including the unit circuit concerning an embodiment.

[Drawing 12]It is a perspective view showing the composition of the portable telephone which applied the electro-optic device.

[Drawing 13]It is a perspective view showing the composition of the digital still camera which applied the electro-optic device.

[Drawing 14]It is a figure showing an example of the conventional unit circuit which drives a current type driven element.

[Description of Notations]
C -- Capacitor
L -- Driven element
Tr1 -- Drive transistor
Tr2 -- Switching transistor (the 2nd switching transistor)
Tr3 -- Switching transistor (the 1st switching transistor)
Tr4 -- Compensation transistor
V -- Power source wire
D -- Data line
S -- Scanning line

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]It is a block diagram showing the composition of the electro-optic device which applied the unit circuit concerning the 1st example of this invention.
[Drawing 2](a) and (b) are the figures showing the composition of the pixel circuit as a unit circuit, respectively.
[Drawing 3]It is a timing chart for explaining the drive method of the pixel circuit.
[Drawing 4](a) - (c) is a figure showing a part of manufacturing process of the electro-optic device, respectively.
[Drawing 5](a) And (b) is a figure showing a part of manufacturing process of the electro-optic device, respectively.
[Drawing 6]It is a block diagram showing the composition of the electro-optic device which applied the unit circuit concerning the 2nd example of this invention.
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[Drawing 8]It is a figure showing the composition of the pixel circuit as the unit circuit.
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[Description of Notations]

C -- Capacitor

L -- Driven element

Tr1 -- Drive transistor

Tr2 -- Switching transistor (the 2nd switching transistor)

Tr3 -- Switching transistor (the 1st switching transistor)

Tr4 -- Compensation transistor

V -- Power source wire

D -- Data line

S -- Scanning line

[Translation done.]

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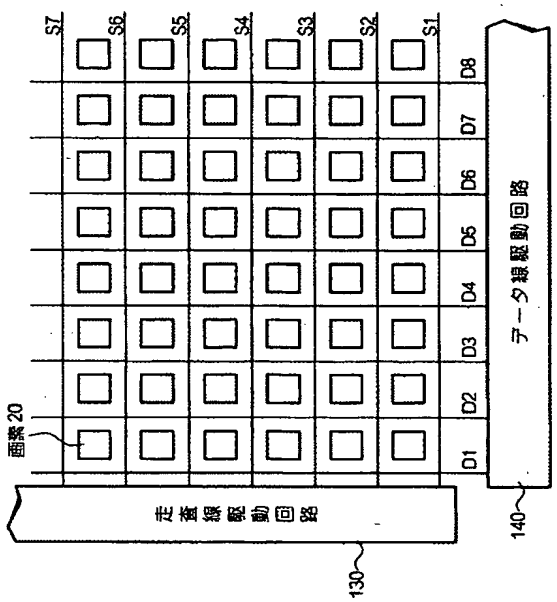
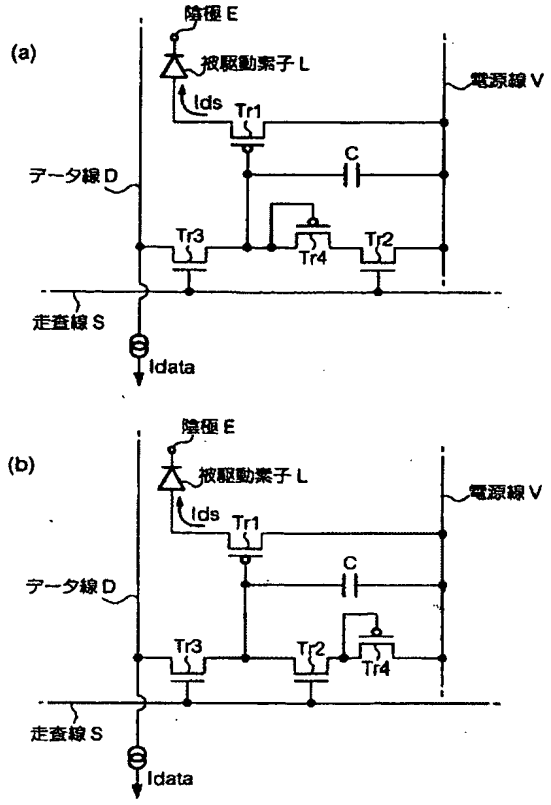
DRAWINGS

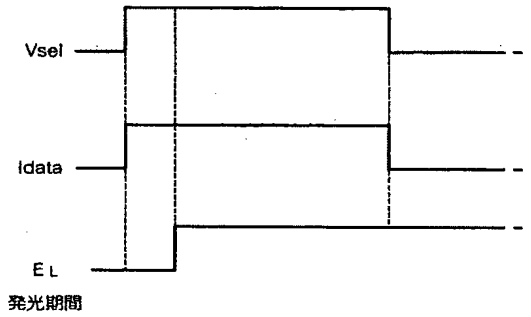
[Drawing 1]



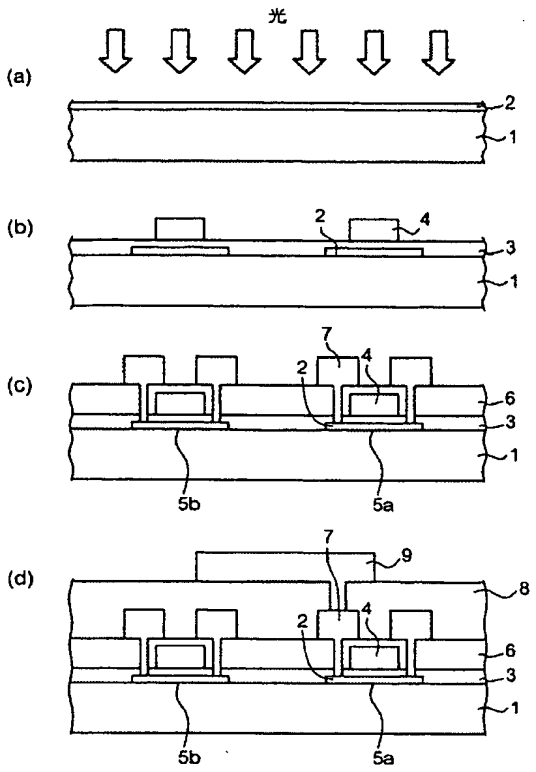
[Drawing 2]



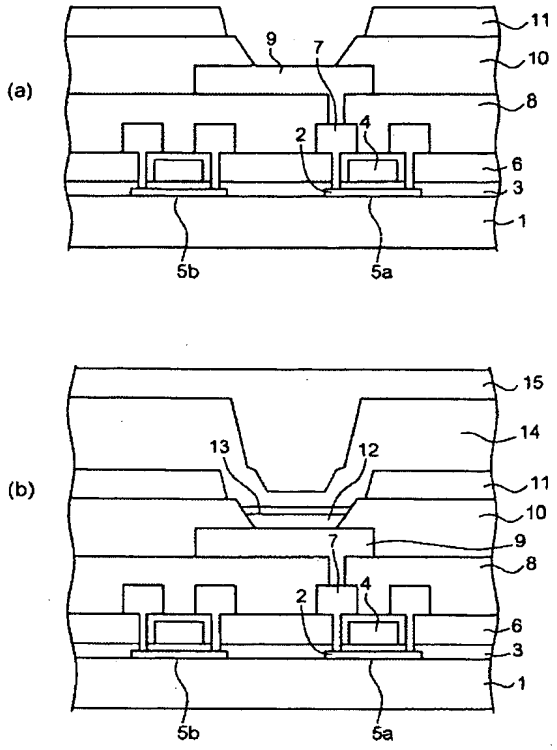
[Drawing 3]



[Drawing 4]



[Drawing 5]


(a)
11
10
9
7
8
4
2
6
3
1
5b
5a
(b)
15
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12
11
10
7
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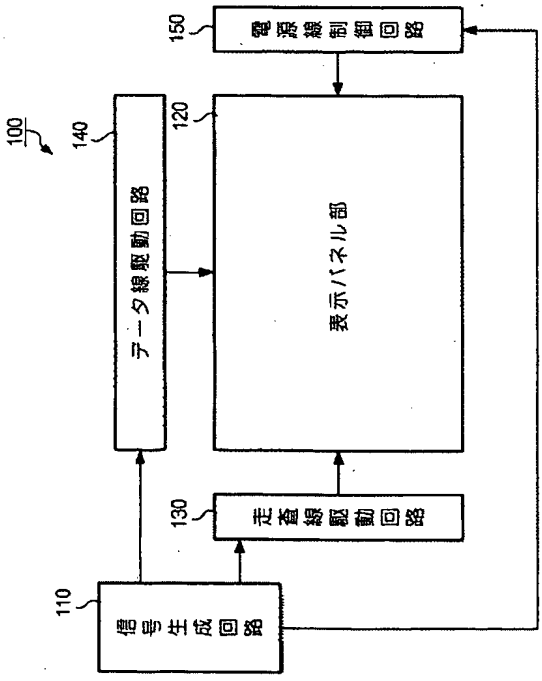
2
6
3
1
5b
5a

[Drawing 6]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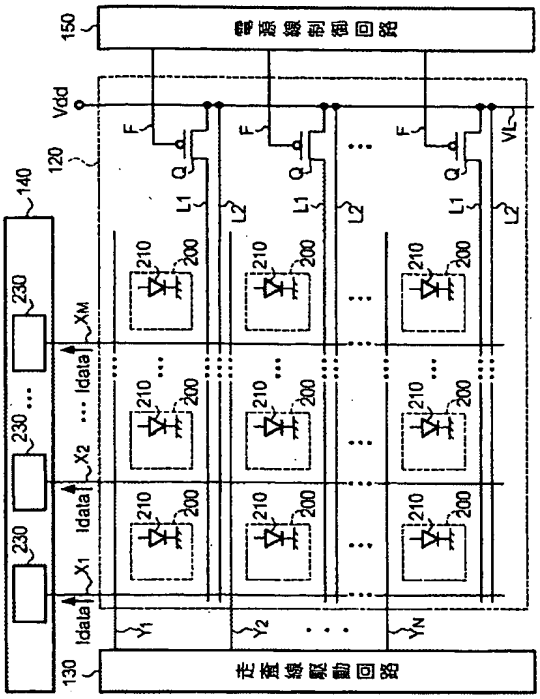
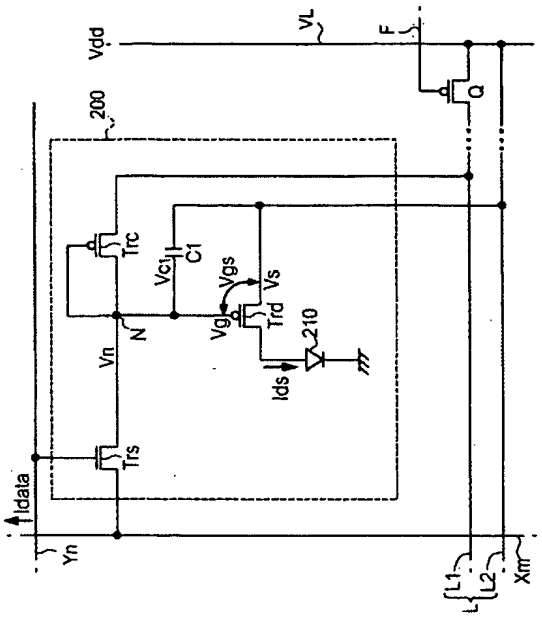
100
140
120
データ線駆動回路
表示パネル部
130
走査線駆動回路
110
信号生成回路

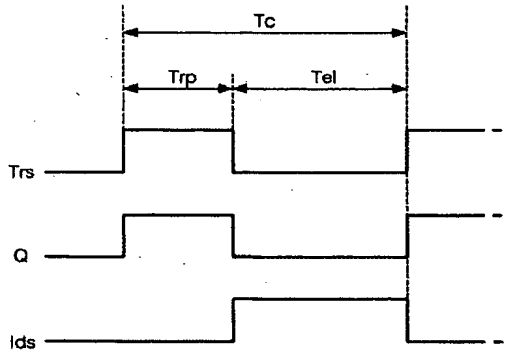
[Drawing 7]



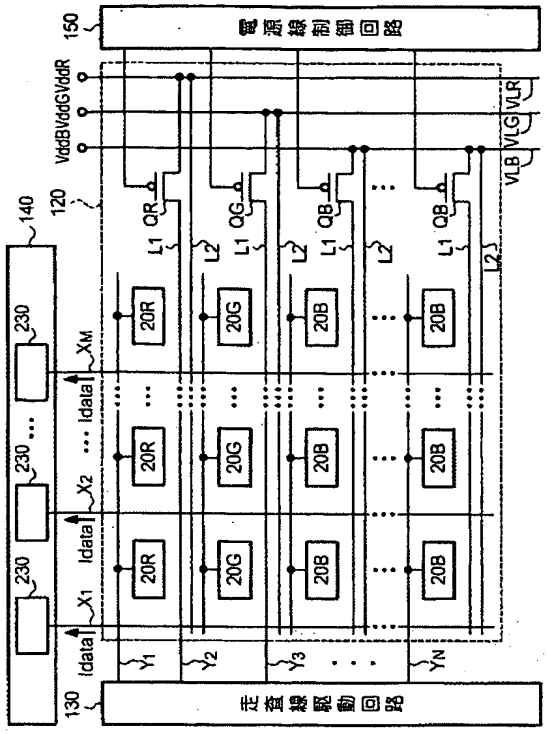
[Drawing 8]



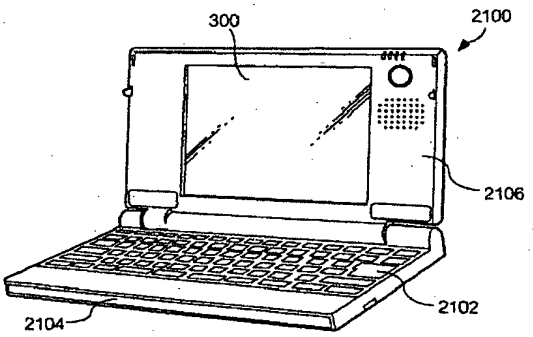
[Drawing 9]



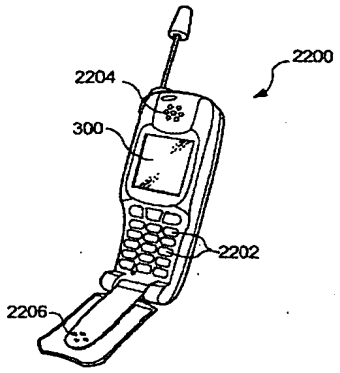
[Drawing 10]



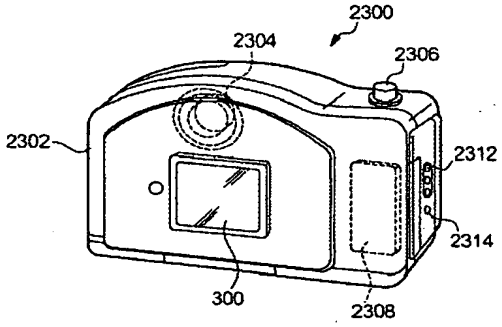
[Drawing 11]



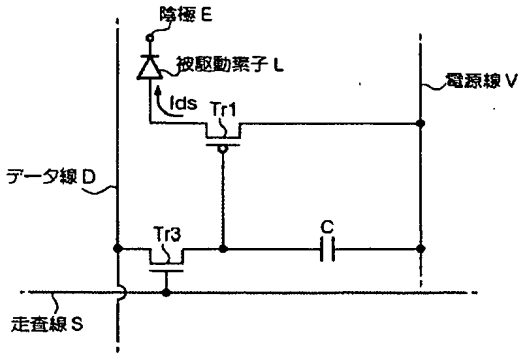
[Drawing 12]



[Drawing 13]



[Drawing 14]



[Translation done.]